REMARKS/ARGUMENTS

This Reply is being filed in response to a final Official Action on a Request for Continued Examination (RCE) for the above-identified patent application. Initially, the final Official Action objects to independent Claim 1, line 23 (and similarly Claims 15 and 21), for reciting "value" after "calculator," the Official Action asserting that the recitation should instead be "values." Applicant respectfully disagrees, however, and notes that claims should in fact recite "value." In this regard, as recited, values are selected for respective ones of a plurality of channels (each channel therefore having a respective, selected value). For each channel, then, the number of possible paths in path length estimation is selected based on the metric calculator value selected for the respective channel (again, each channel having a respective, selected value). And for at least the foregoing reasons, Applicant respectfully submits that the objection to Claim 1 (and similarly Claims 15 and 21) is overcome.

In addition to the foregoing, the final Official Action rejects Claims 1, 3, 4, 6, 9-17, 19-22 and 24 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2004/0120411 to Walton et al., in view of U.S. Patent No. 6,385,753 to Hatakeyama; and rejects the remaining claims, namely Claims 7 and 23, as being unpatentable over Walton in view of Hatakeyama, and further in view of the publication, Kyeong Jin Kim & Ronald A. Iltis, *Joint Detection and Channel Estimation Algorithms for QS-CDMA Signals over Time-Varying Channels* (May 2002) (hereinafter "*Kim/Iltis*"). As explained below, Applicant respectfully submits that the claimed invention is patentably distinct from Walton, Hatakeyama and *Kim/Iltis*, taken individually or in any proper combination. In view of the remarks presented herein, Applicant respectfully requests reconsideration and allowance of all of the pending claims of the present application. Alternatively, as the remarks presented herein do not raise any new issues or introduce any new matter, Applicant respectfully requests entry of this Reply for purposes of narrowing the issues upon appeal.

A. *Claims 1, 3, 4, 6, 9-17, 19-22 and 24 are Patentable*

According to one claimed aspect of the present invention, as recited by independent Claim 1, an apparatus is provided that includes a selector and a decoder. As recited, the selector

is configured to select metric calculator values for respective ones of a plurality of channels in a Multiple-Input, Multiple-Output (MIMO) communication system in which transmit data is communicated to a receiving station upon the plurality of channels and received as receive data thereat. In this regard, the metric calculator values selected for at least two of the channels differ from one another. As also recited, the decoder is configured to separately decode values of the receive data received upon separate ones of the channels. In this regard, for the values of the receive data received upon each of the channels, the decoder is configured to perform path length estimation for the respective channel, including being configured to calculate a path length for each of a number of possible paths upon which to estimate a minimum path length. The number of possible paths is selected based on the metric calculator value selected for the respective channel.

1.   Selecting Metric Calculator Values

In contrast to independent Claim 1, neither Walton nor Hatakeyama (or *Kim/Iltis*), taken individually or in any proper combination, teach or suggest <u>selecting metric calculator values for respective ones of the channels in a MIMO system for a decoder to perform path length estimation for each of the channels, including calculating path lengths for a number of possible paths selected based on a respective metric calculator value</u>. The first Official Action and now the final Official Action allege that Walton discloses performing path length estimation, asserting that Walton discloses a Viterbi decoder that estimates an optimum path length. And to supposedly strengthen this position as to Viterbi decoding, the Official Action now cites Hatakeyama for a particular Viterbi decoder configuration. Applicant respectfully disagrees, and separately addresses each reference below.

a)   Walton

As previously explained, Walton discloses a system and method for performing rate control for data transmission in which a suitable data rate for parallel channels is selected based on estimated channel conditions (signal-to-noise ratios – SNRs). However, Walton (as well as *Kim/Iltis*) does not teach or suggest the aforementioned feature of independent Claim 1. In the

final Official Action, the Office appears to interpret selectable transmission modes of Walton as corresponding to the recited metric calculator values for MIMO channels; and alleges that these transmission modes are supplied to a Viterbi decoder. As further alleged, for each channel (eigenmode), the Viterbi decoder performs path length estimation for the respective channel, including calculating path lengths for a number of possible paths, the number of possible paths being selected based on the transmission mode for the respective channel. Applicant respectfully disagrees.

Walton does appear to disclose selectable transmission modes, but in contrast to the aforementioned interpretation, Walton does not supply its transmission modes to a Viterbi decoder for use by the Viterbi decoder in selecting the number of possible paths for which to calculate path lengths in performing path length estimation, similar to the decoder of independent Claim 1. Rather, according to Walton, its transmission modes (selectable for application to its channels) may indicate transmission parameters indicating a particular data rate, coding scheme or code rate, interleaving scheme, modulation scheme or the like. Walton, paragraph [0028]. As also disclosed, the coding scheme may include CRC coding, convolutional coding, turbo coding, block coding or the like. *Id.* at paragraph [0181]. And depending on the coding scheme according to which data for a channel is coded, the controller 970 (see FIG. 11) supplies decoding control to the decoder for the respective channel so that the decoder may decode the data in a complementary manner. *Id.* at paragraph [0191] ("The de-interleaved data ... is decoded by an associated decoder 1136 in a manner complementary to that performed at access point 510x, as indicated by a decoding control provided by controller 970." – emphasis added). Thus, if the data is coded according to a turbo coding scheme, the decoding control may indicate to the decoder to implement a turbo decoder; and if the data is coded according to a convolutional coding scheme, the decoding control may indicate to the decoder to implement a Viterbi decoder. *Id.*

Even if one could consider the transmission modes of Walton to correspond to the recited selected metric calculator values, Walton still does not teach or suggest that its decoder performs path length estimation for each of the channels, including calculating path lengths for a number of possible paths selected based on a respective transmission mode, similar to the metric

calculator value, similar to independent Claim 1. Instead, Walton at best discloses selecting a transmission mode that indicates a coding scheme for a channel according to a particular transmission mode, and supplying decoding control to a decoder for that channel so that the decoder may operate in a complementary manner.

b) Hatakeyama

Similar to Walton, Applicant respectfully submits that Hatakeyama also does not teach or suggest the aforementioned feature of independent Claim 1. That is, in contrast to independent Claim 1, Hatakeyama also does not teach or suggest a decoder performing path length estimation for each of a plurality of channels, including calculating path lengths for a number of possible paths selected based on a respective, selected metric calculator value. As cited for disclosing features of the claimed invention, Hatakeyama discloses a structure of a Viterbi decoder. As disclosed by Hatakeyama, its Viterbi decoder does calculate a branch metric value (e.g., Euclidian distance) between received data (symbol) and each branch (each possible symbol), and calculate a path metric value for each of a number of state transitions corresponding to the branch metrics, one of which is selected as the maximum likelihood state transition.

Even considering the branch metrics or the path metrics as corresponding to possible paths, nowhere does Hatakeyama teach or suggest that the number of branch metrics or path metrics (possible paths) is selected based on a metric calculator value selected for a particular channel, similar to selecting the number of paths of the path length estimation performed according to independent Claim 1. Rather, the number of branch metrics values is predetermined according to the convolutional code encoding ratio (e.g., rate 1/2, resulting in 4 branch metric values), and the number of path metrics is predetermined (2^{K-1}) according to the restriction length of the convolutional code encoder ($K = 9$, resulting in 256 path metric values). *See* Hatakeyama, col. 6, l. 66 – col. 7, l. 4; and col. 8, ll. 40-44.

Applicant therefore respectfully submits that independent Claim 1, and by dependency Claims 3, 4, 6, 7 and 9-14, is patentably distinct from Walton and Hatakeyama, taken individually or in any proper combination. Applicant also respectfully submits that independent Claims 15 and 21 recite subject matter similar to independent Claim 1, including selecting metric

calculator values for channels in a MIMO system for a decoder to perform path length estimation for each of the channels, including calculating path lengths for a number of possible paths selected based on a respective metric calculator value. Accordingly, Applicant respectfully submit that independent Claims 51 and 21, and by dependency Claims 16, 17, 19, 20 and 22-24, are also patentably distinct from Walton and Hatakeyama, taken individually or in any proper combination, for at least the same reasons given above with respect to independent Claim 1.

2. *The Official Action Fails to Demonstrate Prima Facie Obviousness*

The Official Action alleges that one skilled in the art would have been motivated to combine Walton and Hatakeyama to "improve decoding accuracy in a communication system." Official Action of June 2, 2008, page 4. Applicant respectfully submits, however, that such a broad conclusory statement alone is insufficient to demonstrate obviousness of the claimed invention.

Initially, Appellants acknowledge the Supreme Court's recent decision in which the Court rejected a rigid application of the "teaching, suggestion or motivation" (TSM) test. *KSR Int'l. Co. v. Teleflex, Inc.*, 127 S.Ct. 1727, 82 USPQ2d (BNA) 1385 (2007). Nonetheless, in *KSR Int'l. Co.*, the Court did state that obviousness often requires determining whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue, and that to facilitate review, this analysis should be made explicit. *See KSR Int'l. Co.*, 127 S.Ct. at 1740–41, 82 USPQ2d (BNA) at 1396. Even further, the Court noted that "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *Id.*, 127 S.Ct. at 1740-41, 82 USPQ2d (BNA) at 1396, *citing In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d (BNA) 1329 (Fed. Cir. 2006) (emphasis added).

As clearly explained by the Supreme Court in *KSR Int'l. Co.*, then, any finding of obviousness should be based on an apparent reason to combine the prior art, and must be supported by more than mere conclusory statements. In the instant case, the Office attempts to support the alleged modification of Walton per Hatakeyama by asserting an improvement in decoding accuracy. But nowhere does the Official Action support the aforementioned

conclusion with any reasoning or with some rationale underpinning the conclusion, whether in the nature of the problem to be solved, any of the cited references, or knowledge of those skilled in the art. And in line with the Court in *KSR Int'l. Co.*, the obviousness rejection of the present claims cannot be sustained by merely concluding that one skilled in the art would have found it obvious to modify Walton per Hatakeyama, without at least an explanation of how the alleged modification would have achieved the alleged improvement of decoding accuracy.

For at least the foregoing reasons, Applicant respectfully submits that the rejection of Claims 1, 3, 4, 6, 9-17, 19-22 and 24 as being unpatentable over Walton, in view of Hatakeyama is overcome.

B. Claims 7 and 23 are Patentable

The Official Action rejects Claims 7 and 23 as being unpatentable over Walton in view of Hatakeyama, and further in view of *Kim/Iltis*. Applicant respectfully submits, however, that *Kim/Iltis* does not cure the defects of Walton or Hatakeyama. That is, even considering *Kim/Iltis*, none of Walton, Hatakeyama or *Kim/Iltis*, taken individually or in any proper combination, teach or suggest selecting metric calculator values for channels in a MIMO system for a decoder to perform path length estimation for each of the channels, including calculating path lengths for a number of possible paths selected based on a respective metric calculator value, similar to the claimed invention. Accordingly, Applicant respectfully submit that the claimed invention is patentably distinct from Walton, Hatakeyama and *Kim/Iltis*, taken individually or in any proper combination.

For at least the foregoing reasons, Applicant respectfully submits that the rejection of Claims 7 and 23 as being unpatentable over Walton in view of Hatakeyama, and further in view of *Kim/Iltis* is overcome.
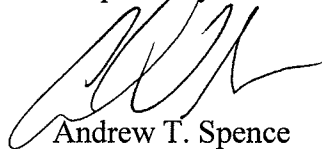
CONCLUSION

In view of the remarks presented above, Applicant respectfully submits that the present application is in condition for allowance. As such, the issuance of a Notice of Allowance is therefore respectfully requested. In order to expedite the examination of the present application, the Examiner is encouraged to contact Applicant's undersigned attorney in order to resolve any remaining issues. As explained above, no new matter or issues are raised by this Reply, and as such, Applicant alternatively respectfully requests entry of this Reply for purposes of narrowing the issues upon appeal.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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